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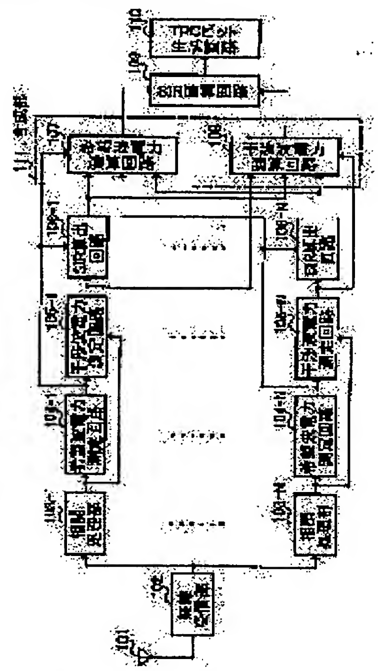
(54) **DESIRED WAVE POWER TO INTERFERENCE WAVE POWER RATIO MEASURING APPARATUS, DESIRED WAVE POWER TO INTERFERENCE WAVE POWER RATIO MEASURING METHOD AND DESIRED WAVE POWER TO INTERFERENCE WAVE POWER MEASURING PROGRAM**

(57)Abstract:
PROBLEM TO BE SOLVED: To improve accuracy in SIR without performing RAKE synthesis.
SOLUTION: In a desired wave power to interference wave power ratio measuring apparatus, desired wave power measuring circuits 104-1 through 104-N measure the desired power of multi-path reception signals for each path, and interference wave power measuring circuits 105-1 through 1-5-N measure interference power of the multi-path reception signals for each path. A synthesizing section 111 applies weight synthesis to at least one of the desired wave power for each path measured by the circuits 104-1 through 104-N or the interference wave power for each path measured by the circuit 105-1 through 105-N. An SIR calculating circuit 109 calculates a desired wave power to interference wave power ratio on the basis of the output value from the section 111.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the wave power pair interference wave power ratio measuring device of choice, the wave power pair interference wave power ratio measurement program of choice, and the wave power pair interference wave power ratio measuring method of choice.
[0002]
[Description of the Prior Art] In CDMA communication system, since each user's signal serves as interference to other users, the transmitted power control which controls the transmitted power in each user to necessary minimum is used. Target receiving [by closed loop transmitted power control / with receiving-side equipment]-among this transmitted power control quality (for example, the wave power pair interference wave power ratio of choice of an input signal (SIR:Signal to Interference Ratio) is beforehand set up as aim receiving quality, and the transmitted power in transmitting-side equipment is controlled so that the receiving quality measured actually approaches this aim receiving quality.) That is, in such transmitted power control, the wave power pair interference wave power ratio measuring device of choice is used.
[0003] About the above-mentioned closed loop transmitted power control, JP,2000-236296,A etc. has a publication. The technology which measures SIR is indicated by this JP,2000-236296,A, without maximum-ratio-compounding the wave signals of choice which were assigned to the multi-pass input signal, respectively and which measured the wave power signal of choice, and interference wave power for every finger, and were measured, and interference wave signals.
[0004] Hereafter, the conventional wave power pair interference wave power ratio measuring device of choice is explained with reference to drawing 5 . Drawing 5 is the block diagram showing the configuration of the receiving set containing the conventional wave power pair interference wave power ratio measuring device of choice. In the receiving set shown in this drawing 5 , the signal transmitted from the sending set which is not illustrated is received from an antenna 11 as a multi-pass signal, predetermined wireless receptions, such as a down convert and frequency conversion, are performed in the wireless receive section 12, and receiving baseband signaling (multi-pass input signal) is acquired.
[0005] The correlation processing section 13-1 - 13-N assign a finger to the predetermined pass location of receiving baseband signaling, perform diffusion process, and output a processing result to the corresponding wave power measuring circuit 14-1 of choice - 14-N. Only the number corresponding to the number of passes of the multi-pass signal which the correlation processing section 13-1 - 13-N receive is formed. Here, the correlation processing section 13-1 assigns a finger to the pass location of a direct wave, correlation processing is performed, and correlation processing section 13-N presupposes that a finger is assigned to the pass location of the N-1st delay waves, and correlation processing is performed.
[0006] The wave power measuring circuit 14-1 of choice - 14-N measure the wave power of choice of the pass which corresponds using the correlation result of an operation outputted from the corresponding correlation processing section 13-1 - 13-N. That is, in the wave power measuring circuit 14-1 of choice - 14-N, the wave power of choice of a multi-pass input signal is measured for every pass. The interference wave power measuring circuit 15-1 - 15-N measure the interference wave power of the pass which corresponds based on the measurement result of the wave power of choice outputted from the correlation processing result, and the corresponding wave power measuring circuit 14-1 of choice - 14-N outputted from the corresponding correlation processing section 13-1 - 13-N. That is, in the interference wave power measuring circuit 15-1 - 15-N, the interference wave power of a multi-pass input signal is measured for every pass.
[0007] The interference wave power measured by the wave power arithmetic circuit 21 of choice where the synthetic section 20 was equipped with the wave power of choice measured in the wave power measuring circuit 14-1 of choice - 14-N in the interference wave power measuring circuit 15-1 - 15-N is outputted to the interference wave power arithmetic circuit 22 with which the synthetic section 20 was equipped, respectively.
[0008] The wave power arithmetic circuit 21 of choice outputs the wave power of choice which adds the wave power of choice for every pass outputted from the wave power measuring circuit 14-1 of choice - 14-N, and is obtained to the SIR arithmetic circuit 16. Moreover, in the interference wave power arithmetic circuit 22, the interference wave power which equalizes the interference wave power for every pass outputted from the interference wave power measuring circuit 15-1 - 15-N, and is obtained is outputted to the SIR arithmetic circuit 16.
[0009] The SIR arithmetic circuit 16 calculates SIR based on the wave power of choice outputted from the wave power arithmetic circuit 21 of choice, and the interference wave power outputted from the interference wave power arithmetic circuit 22. The SIR arithmetic circuit 16 computes SIR according to a degree type. Wave power wishing SIR= / interference wave power [0010] The TPC bit generation circuit 17 compares SIR (henceforth "Calculation SIR") computed in the SIR arithmetic circuit 16 with the aim SIR set up beforehand, when Calculation SIR is smaller than Aim SIR, it generates the TPC bit of the purport which increases transmitted power, and it generates the TPC bit of the purport which decreases transmitted power conversely when Calculation SIR is larger than Aim SIR.
[0011]
[Problem(s) to be Solved by the Invention] However, there is a problem shown below in the above-mentioned conventional technology. That is, since SIR is measured without carrying out the maximum ratio composition (RAKE composition) of the wave signals wishing (1) and the wave power of choice is measured while the noise component of the long periodicity of an interference wave was not fully graduated between pass (that is, between fingers) but it had been overlapped on big interference wave power, the accuracy of measurement of the wave power of choice deteriorates,

and there is a problem that the accuracy of measurement of SIR deteriorates, after all. Especially, when the magnitude to the wave power of choice of interference wave power is comparatively large, deterioration of the SIR accuracy of measurement resulting from the measurement error of this wave power of choice becomes remarkable (namely, when SIR is small).

[0012] (2) Since the wave signal of choice of each pass will be observed as an interferent component between pass (between fingers) in case interference wave power is measured by measuring SIR, without carrying out the maximum ratio composition (RAKE composition) of the wave signals of choice, the accuracy of measurement of the wave power of choice deteriorates, and there is a problem that the SIR accuracy of measurement deteriorates, after all. Especially, when the magnitude to the wave power of choice of interference wave power is comparatively small, deterioration of the SIR accuracy of measurement resulting from the measurement error of this interference wave power becomes remarkable (namely, when SIR is large).

[0013] This invention is made in view of the above-mentioned viewpoint, and aims at offering the wave power pair interference wave power ratio measuring device of choice which can raise the accuracy of measurement, without performing RAKE composition.

[0014]

[Means for Solving the Problem] A wave power pair interference wave power ratio measuring device of choice of this invention A wave power measurement means of choice to measure wave power of choice of a multi-pass input signal for every pass, An interference wave power measurement means to measure interference wave power of said multi-pass input signal for every pass, A weighting composition means which carries out weighting composition at least of one side of wave power of choice for every pass measured in said wave power measurement means of choice, and interference wave power for every pass measured in said interference wave power measurement means, A configuration possessing a 1st calculation means to compute a wave power pair interference wave power ratio of choice based on a synthetic result of said weighting composition means is taken.

[0015] Since wave power of choice and interference wave power of each pass can be found with a sufficient precision by performing suitable (for example, it having responded to reliability of wave power of choice of each pass, or interference wave power) weighting according to this configuration, a wave power pair interference wave power ratio of choice is computable with a sufficient precision using such wave power of choice, and interference wave power.

[0016] A wave power pair interference wave power ratio measuring device of choice of this invention A 2nd calculation means to compute a ratio of wave power of choice measured in a wave power measurement means of choice and interference wave power measured in an interference wave power measurement means in the above-mentioned wave power pair interference wave power ratio measuring device of choice is provided. A weighting composition means at least to one side of wave power of choice for every pass measured in said wave power measurement means of choice, and interference wave power for every pass measured in said interference wave power measurement means Weighting according to a calculation result in said 2nd calculation means is performed, and a configuration which compounds power after weighting is taken.

[0017] Since wave power of choice and interference wave power of each pass can be found with a sufficient precision by performing weighting according to a ratio (namely, SIR) of wave power of choice of each pass, and interference wave power according to this configuration, a wave power pair interference wave power ratio of choice is computable with a sufficient precision using such wave power of choice, and interference wave power.

[0018] The wave power pair interference wave power ratio measuring device of choice of this invention takes the configuration which performs weighting with the increasing function which increases in monotone with an increment in a calculation result in the 2nd calculation means to the interference wave power which a weighting composition means measured in wave power of choice or an interference wave power measurement means measured in a wave power measurement means of choice in the above-mentioned wave power pair interference wave power ratio measuring device of choice.

[0019] According to this configuration, wave power of choice or interference wave power of each pass can be found with a sufficient precision by performing weighting according to SIR of each pass. Therefore, a wave power pair interference wave power ratio of choice is computable with a sufficient precision.

[0020] The configuration which compounds the interference wave power which the wave power pair interference wave power ratio measuring device of this invention of choice removed [in the above-mentioned wave power pair interference wave power ratio measuring device of choice] the interference wave component by the wave power of pass other than said object pass of choice among the wave power of choice which measured in the wave power measurement means of choice from the interference wave power of the object pass which measured a weighting composition means in an interference wave power measurement means, and removed this interferent component takes.

[0021] According to this configuration, interference wave power of each pass can be found with a sufficient precision from interference wave power of each pass by removing an interferent component by wave power of choice other than the pass concerned. Since measurement of interference wave power which was not based on fluctuation of wave power of choice, but was stabilized can be performed by this, a wave power pair interference wave power ratio of choice is computable with a sufficient precision.

[0022] As for a wave power pair interference wave power ratio measuring device of choice of this invention, in the above-mentioned wave power pair interference wave power ratio measuring device of choice, a weighting composition means takes a configuration to which weighting is carried out with an increasing function which increases in monotone with an increment in a calculation result in the 2nd calculation means to wave power of choice measured in a wave power measurement means of choice.

[0023] According to this configuration, wave power of choice of each pass can be found with a sufficient precision by performing weighting according to SIR of each pass. Therefore, a wave power pair interference wave power ratio of choice is computable with a sufficient precision.

[0024] A wave power pair interference wave power ratio measuring method of choice of this invention A wave power measurement process of choice which measures wave power of choice of a multi-pass input signal for every pass, An interference wave power measurement process which measures interference wave power of said multi-pass input signal for every pass, A weighting composition process which carries out weighting composition at least of one side of wave power of choice for every pass measured in said wave power measurement means of choice, and interference wave power for every pass measured in said interference wave power measurement means, The 1st calculation process which computes a wave power pair interference wave power ratio of choice based on a synthetic result of said weighting

composition means was provided.
[0025] Since wave power of choice and interference wave power of each pass can be found with a sufficient precision by performing suitable (for example, it having responded to reliability of wave power of choice of each pass, or interference wave power) weighting according to this method, a wave power pair interference wave power ratio of choice is computable with a sufficient precision using such wave power of choice, and interference wave power.
[0026] The wave power pair interference wave power ratio measuring method of this invention of choice compounded the interference wave power which removed the interference wave component by the wave power of choice of pass other than said object pass among the wave power of choice which measured in a wave power measurement process of choice, and removed this interferent component from the interference wave power of the object pass which measured a weighting composition process in an interference wave power measurement process in the above-mentioned wave power pair interference wave power ratio measuring method of choice.
[0027] According to this method, interference wave power of each pass can be found with a sufficient precision from interference wave power of each pass by removing an interferent component by wave power of choice other than the pass concerned. Since measurement of interference wave power which was not based on fluctuation of wave power of choice, but was stabilized can be performed by this, a wave power pair interference wave power ratio of choice is computable with a sufficient precision.
[0028] A wave power pair interference wave power ratio measurement program of choice of this invention A wave power measurement means of choice to measure wave power of choice of a multi-pass input signal for a computer for every pass, An interference wave power measurement means to measure interference wave power of said multi-pass input signal for every pass, A weighting composition means which carries out weighting composition at least of one side of wave power of choice for every pass measured in said wave power measurement means of choice, and interference wave power for every pass measured in said interference wave power measurement means, A configuration which considers as a 1st calculation means to compute a wave power pair interference wave power ratio of choice based on a synthetic result of said weighting composition means, and is operated is taken.
[0029] Since wave power of choice and interference wave power of each pass can be found with a sufficient precision by performing suitable (for example, it having responded to reliability of wave power of choice of each pass, or interference wave power) weighting according to this configuration, a program which computes a wave power pair interference wave power ratio of choice with a sufficient precision using such wave power of choice and interference wave power can be offered.
[0030] The wave power pair interference wave power ratio measurement program of this invention of choice takes the configuration in which a weighting composition means compounds the interference wave power which removed the interference wave component by the wave power of choice of pass other than said object pass among the wave power of choice which measured in the wave power measurement means of choice, and removed this interferent component from the interference wave power of the object pass which measured in an interference wave power measurement means in the above-mentioned wave power pair interference wave power ratio measurement program of choice.
[0031] According to this configuration, interference wave power of each pass can be found with a sufficient precision from interference wave power of each pass by removing an interferent component by wave power of choice other than the pass concerned. Since measurement of interference wave power which was not based on fluctuation of wave power of choice, but was stabilized can be performed by this, a program which computes a wave power pair interference wave power ratio of choice with a sufficient precision can be offered.
[0032] A wave power pair interference wave power ratio measurement program of choice of this invention In the above-mentioned wave power pair interference wave power ratio measurement program of choice a weighting composition means A weighting means to perform weighting to interference wave power for every pass measured in wave power of choice for every pass or an interference wave power measurement means measured in a wave power measurement means of choice, A storage means to memorize wave power of choice or interference wave power after weighting composition by which weighting composition was carried out by the last processing timing, wave power of choice after weighting composition which carried out reading appearance from said storage means or interference wave power after weighting, and an output value of said weighting means in this control timing are added, and a configuration possessing an addition means to overwrite an addition result at said storage means is taken.
[0033] According to this configuration, wave power of choice after weighting composition is serially found for every pass, and since wave power of choice after weighting for which it asked is overwritten at memory (storage means), the amount of memory is reducible from a case where weighting composition is put in block and performed.
[0034]
[Embodiment of the Invention] this invention persons paid their attention to the relation between SIR in each pass, and the accuracy of measurement of the wave power of choice in each pass, and interference wave power about the wave power pair interference wave power ratio of choice (it abbreviates to "SIR" hereafter) which did not perform RAKE composition but was computed for every pass. this invention persons and the wave power of choice of (1) each pass The wave power of choice of each pass is computable with a sufficient precision by being measured as power of the received wave with which the actual wave of choice was overlapped on the interference wave, and reducing the effect of this interference wave in consideration of SIR of the pass concerned, (2) Since a actual interference wave is overlapped on the wave of choice of other pass as an interference wave and it is measured, the interference wave power of each pass In addition, by reducing the effect of the wave of choice of pass in consideration of SIR of the pass concerned, it finds out that the interference wave power of each pass is computable with a sufficient precision, and came to carry out this invention.
[0035] That is, the main point of this invention is performing weighting according to SIR in the pass at least to one side of the wave power of choice computed for every pass, and interference wave power, compounding the power after weighting, and measuring SIR using the synthetic result.
[0036] Hereafter, the operation gestalt of this invention is explained to details with reference to an accompanying drawing.
(Gestalt 1 of operation) Drawing 1 is the block diagram showing the configuration of the receiving set containing the wave power pair interference wave power ratio measuring device of choice concerning the gestalt 1 of operation of this invention. In the receiving set shown in this drawing 1 , the signal transmitted from the sending set which is not illustrated is received from an antenna 101 as a multi-pass signal, predetermined wireless receptions, such as a down convert and frequency conversion, are performed in the wireless receive section 102, and receiving baseband signaling

(multi-pass input signal) is acquired.

[0037] The correlation processing section 103-1 - 103-N assign a finger to the predetermined pass location of receiving baseband signaling, perform diffusion process, and output a processing result to the corresponding wave power measuring circuit 104-1 of choice - 104-N. Only the number corresponding to the number of passes of the multi-pass signal which the correlation processing section 103-1 - 103-N receive is formed. Here, the correlation processing section 103-1 assigns a finger to the pass location of a direct wave, correlation processing is performed, and correlation processing section 103-N presupposes that a finger is assigned to the pass location of the N-1st delay waves, and correlation processing is performed.

[0038] The wave power measuring circuit 104-1 of choice - 104-N measure the wave power of choice of the pass which corresponds using the correlation result of an operation outputted from the corresponding correlation processing section 103-1 - 103-N. That is, in the wave power measuring circuit 104-1 of choice - 104-N, the wave power of choice of a multi-pass input signal is measured for every pass. The interference wave power measuring circuit 105-1 - 105-N measure the interference wave power of the pass which corresponds based on the measurement result of the wave power of choice outputted from the correlation processing result, and the corresponding wave power measuring circuit 104-1 of choice - 104-N outputted from the corresponding correlation processing section 103-1 - 103-N. That is, in the interference wave power measuring circuit 105-1 - 105-N, the interference wave power of a multi-pass input signal is measured for every pass.

[0039] The SIR measuring circuit 106-1 - 106-N compute the wave power pair interference wave power ratio of choice (SIR:Signal to Interference Ratio) based on the measurement result of the interference wave power outputted from the measurement result of the wave power of choice, and the corresponding interference wave power measuring circuit 105-1 - 105-N outputted from the corresponding wave power measuring circuit 104-1 of choice - 104-N.

[0040] SIR computed in the wave power of choice and the SIR calculation circuit 106-1 - 106-N which were measured in the wave power measuring circuit 104-1 of choice - 104-N is outputted to the wave power arithmetic circuit 107 of choice with which the synthetic section 111 was equipped, respectively. Moreover, SIR computed in the interference wave power and the SIR calculation circuit 106-1 - 106-N which were measured in the interference wave power measuring circuit 105-1 - 105-N is outputted to the interference wave power arithmetic circuit 108 with which the synthetic section 111 was equipped, respectively.

[0041] The synthetic section 111 is equipped with the wave power arithmetic circuit 107 of choice, and the interference wave power arithmetic circuit 108, and carries out weighting composition at least of one side of the wave power of choice for every pass measured by the wave power measuring circuit 104-1 of choice - 104-N, and the interference wave power for every pass measured by the interference wave power measuring circuit 105-1 - 105-N at least in one side of these circuits. That is, the wave power arithmetic circuit 107 of choice performs weighting according to SIR for every pass outputted to the wave power of choice for every pass outputted from the wave power measuring circuit 104-1 of choice - 104-N from the SIR calculation circuit 106-1 - 106-N, and outputs the wave power of choice after the weighting composition obtained by compounding these (specifically addition or equalization) to the SIR arithmetic circuit 109. Moreover, the interference wave power arithmetic circuit 108 performs weighting according to SIR for every pass outputted to the interference wave power for every pass outputted from the interference wave power measuring circuit 105-1 - 105-N from the SIR calculation circuit 106-1 - 106-N, and outputs the interference wave power after the weighting composition obtained by compounding these (specifically addition or equalization) to the SIR arithmetic circuit 109.

[0042] In addition, although this invention can be carried out when at least one side of the wave power arithmetic circuit 107 of choice and the interference wave power arithmetic circuit 108 performs weighting composition, it explains to an example the case where the wave power arithmetic circuit 107 of choice and the interference wave power arithmetic circuit 108 all perform weighting, in the gestalt of this operation.

[0043] The SIR arithmetic circuit 109 calculates SIR based on the wave power of choice after the weighting composition outputted from the wave power arithmetic circuit 107 of choice, and the interference wave power after the weighting composition outputted from the interference wave power arithmetic circuit 108. The SIR arithmetic circuit 109 computes SIR according to (a formula 1).

[0044]

Interference wave power after the wave power of choice / weighting composition after SIR= weighting composition .... (formula 1)

The TPC bit generation circuit 110 compares SIR (henceforth "Calculation SIR") computed in the SIR arithmetic circuit 109 with the aim SIR set up beforehand, when Calculation SIR is smaller than Aim SIR, it generates the TPC bit of the purport which increases transmitted power, and it generates the TPC bit of the purport which decreases transmitted power conversely when Calculation SIR is larger than Aim SIR.

[0045] Subsequently, actuation of the receiving set of the above-mentioned configuration is explained. In the wireless receive section 102, predetermined wireless reception is performed to the input signal incorporated from the antenna 101, a finger is assigned to the pass location of a direct wave and each delay wave in the correlation processing section 103-1 - 103-N, and back-diffusion-of-gas processing is performed to it, and it is outputted to the wave power measuring circuit 104-1 of choice - 104-N, and the interference wave power measuring circuit 105-1 - 105-N. In the wave power measuring circuit 104-1 of choice - 104-N, the wave power of choice is measured for every pass, and interference wave power is measured for every pass in the interference wave power measuring circuit 105-1 - 105-N. In the SIR calculation circuit 106-1 - 106-N, SIR is computed based on the wave power of choice and interference wave power which were measured for every pass. This SIR is computed for every pass.

[0046] Here, actuation of the wave power arithmetic circuit 107 of choice is explained. In the wave power arithmetic circuit 107 of choice, weighting composition according to SIR for every pass outputted to the wave power of choice for every pass outputted from the wave power measuring circuit 104-1 of choice - 104-N from the SIR calculation circuit 106-1 - 106-N is performed, and the wave power of choice after weighting composition is computed. Specifically, the wave power of choice after weighting composition is computed by following for showing below (formula 2).

[0047]

Wave power of choice =sigma after weighting composition [the wave power wishing f(SIR (K)) x (K)] .... (formula 2)

However, f is taken as the function of arbitration. the [moreover, / by which K is the natural number with which 1 <=K<=N is filled, and SIR (K) was computed in SIR calculation circuit 106-K (not shown)] -- SIR of a K-1 delay wave is shown. In addition, SIR (1) is SIR of the direct wave computed in the SIR calculation circuit 106-1. the [moreover, /

by which the wave power of choice (K) was measured in wave power measuring circuit of choice 104-K (not shown)] -- it is the measured value of the wave power of choice of a K-1 delay wave. In addition, the wave power of choice in K= 1 (1) is as a result of [of the wave power of choice of the direct wave measured in the wave power measuring circuit 104-1 of choice] measurement.

[0048] Set and it takes into consideration that the reliability of the wave power of choice for every pass is so high that SIR for every pass is high. this (formula 2) -- Weighting composition according to the reliability of the wave power of choice is performed by attaching the weight which increases in monotone with the increment in SIR for every pass to the wave power of choice for every pass (that is, wave power of choice (K)), and compounding between pass this wave power of choice for every pass that carried out weighting. This weighting composition is realizable by making f into the increasing function of arbitration in (a formula 2).

[0049] In addition, SIR (K) is very low, and it can be referred to as f(SIR (K)) = 0 when it is thought that the reliability of the wave power of choice (K) is low. Thus, the compounded wave power of choice is outputted to the SIR arithmetic circuit 109 as wave power of choice after weighting.

[0050] Next, actuation of the interference wave power arithmetic circuit 108 is explained. In the interference wave power arithmetic circuit 108, the interference wave power after weighting composition is computed from the injury line crack with weight according to SIR for every pass outputted to the interference wave power for every pass outputted from the interference wave power measuring circuit 105-1 - 105-N from the SIR calculation circuit 106-1 - 106-N, and the interference wave power by which weighting was carried out. Specifically, the interference wave power after weighting composition is computed by following for showing below (formula 3).

[0051]

Interference wave power after weighting composition = sigma [g(SIR (K)) x interference wave power (K)] / N .... (formula 3)

However, g considers as the function of arbitration and N is taken as a number of passes. the [moreover, / by which K is the natural number with which 1 <=K<=N is filled, and interference wave power (K) was measured in interference wave power measuring circuit 105-K (not shown)] -- it is the measured value of the interference wave power of a K-1 delay wave. In addition, the interference wave power in K= 1 (1) is as a result of [of the interference wave power of the direct wave measured in the interference wave power measuring circuit 105-1] measurement.

[0052] Set and it takes into consideration that the reliability of the interference wave power for every pass is so high that SIR for every pass is high. this (formula 3) -- Weight which increases in monotone with the increment in SIR for every pass to the interference wave power (that is, interference wave power (K)) for every pass (that is,) Weighting composition according to the reliability of interference wave power is performed by attaching g (SIR (K)) and compounding between pass this interference wave power for every pass that carried out weighting. This weighting composition is realizable by making g into the increasing function of arbitration in (a formula 3).

[0053] In addition, SIR (K) is very low, and it can be referred to as g(SIR (K)) = 0 when it is thought that the reliability of interference wave power (K) is low. Thus, the equalized interference wave power is outputted to the SIR arithmetic circuit 109 as interference wave power after weighting.

[0054] In the SIR calculation circuit 109, SIR is computed based on the wave power of choice after weighting, and the interference wave power after weighting. In the TPC bit generation circuit 110, a TPC bit is computed based on SIR.

[0055] Thus, the computed TPC bit is transmitted to the transmitting-side equipment which multiplex is carried out to transmit data or a pilot symbol, and is not illustrated. Transmitting-side equipment fluctuates transmitted power according to a TPC bit.

[0056] As explained above, according to the gestalt of this operation, in the wave power arithmetic circuit 107 of choice, the wave power of choice measured for every pass can attach weight, and is compounded with the function which increases in monotone with the increment in SIR of the pass. It is amended by this weighting so that SIR of pass is small, and the wave power of choice of that pass may become small.

[0057] Generally, the measurement result of the wave power of choice is overlapped on fixed interference wave power. To interference wave power, when the wave power of choice is comparatively big (i.e., when SIR is large), the interference wave power contained in the measurement result of the wave power of choice becomes small (it can ignore).

[0058] On the other hand, to the wave power of choice, when interference wave power is comparatively big (i.e., when SIR is low), the interference wave power which only the part of interference wave power is large and is contained in the measurement result of the wave power of choice becomes large relatively rather than the wave power of choice with the actual measurement result of the wave power of choice.

[0059] That is, the interference wave power contained in the wave power of choice of the pass concerned becomes large relatively, and the reliability over the measurement result of the wave power of choice of the pass concerned becomes small, so that SIR of pass is small. Then, in the gestalt of this operation, weighting composition according to the reliability (for example, SIR) of the wave power of choice is carried out in the wave power arithmetic circuit 107 of choice. That is, to the wave power of choice measured in the wave power measuring circuit 104-1 of choice - 104-N, such big weight is attached and the value after the weighting is compounded that SIR is large (addition). Since this computes SIR using the wave power of choice by which weighting composition was carried out according to the reliability of each pass, SIR is computable with a sufficient precision.

[0060] Moreover, in the interference wave power arithmetic circuit 108, the reliability of the interference wave power measured for every pass becomes so large that SIR of the pass is large. Therefore, since weighting according to the reliability of interference wave power is performed by carrying out weighting to the increment in SIR of the pass with the function which increases in monotone with interference wave power, the wave power pair interference wave power of choice is computable with a sufficient precision.

[0061] By the way, to the wave power of choice, when interference wave power is extremely small (i.e., when SIR is extremely large), it is also considered that interference occurs, become an interferent component proportional to the wave power of choice, the measurement result of interference wave power is overlapped, and receiving quality deteriorates by the autocorrelation of the pass concerned.

[0062] When this SIR is extremely large, it becomes impossible for this reason, to amend with a sufficient precision with the function of the above monotonous increments. Then, when SIR exceeds a predetermined threshold, weighting is carried out by the monotonically decreasing function, and in not exceeding, it carries out weighting with an increasing function. By this, even when SIR is extremely big, interference by the autocorrelation can be suppressed, and

deterioration of receiving quality can be prevented.
[0063] Furthermore, in the gestalt of this operation, since SIR is computed using the wave power of choice and interference wave power which compounded by carrying out weighting mentioned above, accurate SIR can be obtained.
[0064] (Gestalt 2 of operation) Drawing 2 is a flow chart explaining the procedure to the receiving baseband signaling in the receiving set concerning the gestalt of this operation. in addition, the receiving set which shows the receiving set concerning the gestalt of this operation to drawing 1 and abbreviation -- the same configuration is taken. Moreover, receiving baseband signaling shall be received by the pass of N book in the gestalt of this operation.
[0065] the flow chart shown in this drawing 2 -- it is, and first, at step (it abbreviates to "ST" hereafter) 201, the pass number K is set as K= 0, and, subsequently the increment of the pass number K is carried out only for "1" in ST202. Processing to ST209 later mentioned from this ST202 is repeatedly performed from K= 1 to K=N. Hereafter, the SIR calculation processing in the gestalt of this operation of the processing performed to the Kth pass for an example is explained.
[0066] In ST203, in correlation processing section 103-K shown in drawing 1 , a finger is assigned to the Kth pass and correlation processing is performed. Subsequently, in ST204, the wave power of choice of the Kth pass (K) is measured using the processing result in correlation processing section 103-K in wave power measuring circuit of choice 104-K shown in drawing 1 . Subsequently, in ST205, the interference wave power (K) of the Kth pass is measured using the processing result in correlation processing section 103-K in interference wave power measuring circuit 105-K shown in drawing 1 . And in ST206, SIR (K) of the Kth pass is computed in SIR calculation circuit 106-K shown in drawing 1 based on the measurement result in wave power measuring circuit of choice 104-K, and interference wave power measuring circuit 105-K.
[0067] Subsequently, in ST207, it follows for showing below (formula 4), and weighting composition is performed to the wave power of choice. In addition, weighting composition of this wave power of choice is performed in the wave power arithmetic circuit 107 of choice shown in drawing 1 .
Wave power [after weighting composition] of choice (K) = Wave power [after weighting composition] of choice (K-1) + [the wave power wishing f(SIR (K)) x (K)] .... (formula 4)
Thus, the wave power of choice after the computed weighting composition (K) is memorized by the evacuation memory (graphic display abbreviation) prepared in the wave power arithmetic circuit 107 of choice.
[0068] Subsequently, in ST208, it follows for showing below (formula 5), and weighting composition is performed to interference wave power. In addition, weighting composition of this interference wave power is performed in the interference wave power arithmetic circuit 108 shown in drawing 1 .
Interference wave power [after weighting composition] (K) = Interference wave power (K-1) + [g(SIR (K)) x interference wave power (K)] / N after weighting composition .... (formula 5)
Thus, the computed interference wave power (K) is stored in the evacuation memory (graphic display abbreviation) prepared in the interference wave power arithmetic circuit 108.
[0069] Subsequently, in ST209, if it is K=N, it will shift to ST210, and if it is K!=N, it will shift to ST202. Thereby, processing of ST202-ST209 is repeatedly performed until it becomes K=N. Thus, in case it progresses to ST210 by repeating processing until it becomes K=N, in the wave power arithmetic circuit 107 of choice, the wave power of choice after the weighting composition by which weighting composition of the wave power of choice about all pass was carried out (N) is computed, and the interference wave power (N) with which weighting composition of the wave power of choice about all pass was carried out is computed in the interference wave power arithmetic circuit 108.
[0070] Here, the actuation which computes the wave power of choice after the weighting composition which carried out weighting composition about all pass (N) is further explained with reference to (a formula 5). The wave power of choice (K) is inputted into the wave power arithmetic circuit 107 of choice sequentially from K= 1, and weighting using an increasing function (namely, f (SIR (K-1))) is performed to it to this wave power of choice (K). And the wave power of choice after the weighting composition obtained by the last processing timing (K-1) is added to the wave power of choice after this weighting (namely, wave power wishing f(SIR (K)) x (K)), and the wave power of choice after the weighting composition in this control timing (K) is computed. In addition, reading appearance of the wave power of choice after weighting composition (K-1) is carried out from the evacuation memory prepared in the wave power arithmetic circuit 107 of choice, and it is used for addition processing. Moreover, the wave power of choice after the weighting composition computed in this control timing (K) is overwritten by the same evacuation memory as the evacuation memory in which the wave power of choice after weighting composition (K-1) was stored. By repeating such processing from K= 1 to K=N, and performing it, the wave power of choice after the weighting composition which carried out weighting composition about all pass (N) is computed.
[0071] Thus, the wave power of choice after weighting composition is serially found for every pass, and since the wave power of choice after weighting for which it asked is overwritten at evacuation memory, the amount of memory can be reduced rather than the case where weighting composition is put in block and performed (namely, when computing the wave power of choice after weighting composition about all pass and adding this calculation result collectively).
[0072] Subsequently, in ST210, SIR is computed in the SIR arithmetic circuit 109 shown in drawing 1 using the wave power of choice after weighting composition (N), and the interference wave power after weighting composition (N).
[0073] Subsequently, in ST211, in the TPC bit generation circuit 110 shown in drawing 1 , SIR calculated in the SIR arithmetic circuit 109 is compared with the aim SIR set up beforehand, and a TPC bit is generated.
[0074] Although calculation of the wave power of choice after weighting composition (N) and the interference wave power after weighting composition (N) were found by repeat processing with the above procedure, it is also possible to compute, as it is not based on repeat processing but is shown in a formula (2) and a formula (3).
[0075] Thus, in the gestalt of this operation, since the wave power of choice after weighting composition (N) and the interference wave power after weighting composition (N) are found by repeat processing (formula 2) (formula 3), the evacuation memory of processed data is reducible from the case (gestalt 1 reference of operation) where followed and it asks at once.
[0076] (Gestalt 3 of operation) The gestalt of this operation is the modification of the gestalt 1 of operation, and the content of weighting to the wave power of choice and interference wave power differs from the gestalt 1 of operation. Drawing 3 is the block diagram showing the configuration of the receiving set containing the wave power pair interference wave power ratio measuring device of choice concerning the gestalt 3 of operation of this invention. In this drawing 3 , the same sign as drawing 1 is given to the same component as drawing 1 , and that detailed explanation is omitted.

[0077] In this drawing 3 , the wave power of choice measured in the wave power measuring circuit 104-1 of choice - 104-N is outputted to the wave power arithmetic circuit 302 of choice with which the synthetic section 301 was equipped, respectively. SIR computed in the SIR calculation circuit 106-1 - 106-N is outputted to the wave power arithmetic circuit 302 of choice and the interference wave power arithmetic circuit 303 with which the synthetic section 301 was equipped. Moreover, the interference wave power measured in the interference wave power measuring circuit 105-1 - 105-N is outputted to the interference wave power arithmetic circuit 303 with which the synthetic section 301 was equipped.

[0078] The synthetic section 301 is equipped with the wave power arithmetic circuit 302 of choice, and the interference wave power arithmetic circuit 303. The wave power arithmetic circuit 302 of choice performs weighting according to SIR for every pass outputted to the wave power of choice for every pass outputted from the wave power measuring circuit 104-1 of choice - 104-N from the SIR calculation circuit 106-1 - 106-N, and outputs the wave power of choice after the weighting composition which compounds these and is obtained to the interference wave power arithmetic circuit 303 and the SIR arithmetic circuit 109. The wave power of choice after this weighting composition is computed by following for having mentioned above (formula 2).

[0079] Moreover, the interference wave power arithmetic circuit 303 performs weighting according to the wave power of choice after the weighting composition outputted from the wave power of choice for every pass and the wave power arithmetic circuit 302 of choice which were outputted to the interference wave power for every pass outputted from the interference wave power measuring circuit 105-1 - 105-N from the wave power measuring circuit 104-1 of choice - 104-N, and outputs the interference wave power after weighting composition to the SIR arithmetic circuit 109. That is, the interference wave power arithmetic circuit 303 receives the interference wave power for every pass outputted from the interference wave power measuring circuit 105-1 - 105-N. It carries out based on the wave power of choice for every pass outputted from the wave power of choice after weighting outputted from the wave power arithmetic circuit 302 of choice and the wave power measuring circuit 104-1 of choice - 104-N. Weighting which removes the interferent component (that is, interferent component by the multi-pass) by wave power of choice other than self-pass is performed, and the interference wave power after weighting composition is computed by the equalization during pass.

[0080] In the gestalt of this operation, the interference wave power after weighting is computed in consideration of SIR being widely used in transmitted power control. That is, in the gestalt of this operation, improvement in precision of transmitted power control is aimed at by preventing the increment in the interference wave power by removing the interferent component (that is, interferent component by the multi-pass of the signal addressed to a local station) resulting from the signal addressed to a local station, and making the transmitted power of the signal addressed to a local station increase from the measurement result of interference wave power.

[0081] It follows for specifically showing below (formula 6), and the interference wave power after weighting composition is obtained.

Interference wave power [after weighting composition] = sigma[interference wave (power K) - (wave power wishing S-(K)) / SF] / N .... (formula 6)

[0082] However, the wave power of choice after weighting composition and SF make it as the diffusion coefficient of receiving baseband signaling, and N makes S a number of passes. the [moreover, / by which K is the natural number with which 1 <=K<=N is filled, and interference wave power (K) was measured in interference wave power measuring circuit 105-K (not shown)] -- it is the measured value of the interference wave power of a K-1 delay wave. In addition, interference wave power (1) is as a result of [of the interference wave power of the direct wave measured in the interference wave power measuring circuit 105-1] measurement. the [moreover, / by which the wave power of choice (K) was measured in wave power measuring circuit of choice 104-K (not shown)] -- it is the measured value of the wave power of choice of a K-1 delay wave. In addition, the wave power of choice (1) is as a result of [of the wave power of choice of the direct wave measured in the wave power measuring circuit 104-1 of choice] measurement.

[0083] this (formula 6) -- it set and the interferent component (that is, (wave power wishing S-(K)) / SF) by the wave power of choice in pass other than this object pass is removed from the interference wave power (that is, interference wave power (K)) of object pass (here Kth pass). And the interference wave power after weighting composition is obtained by equalizing between pass interference wave power (that is, interference wave power with which the interferent component by the multi-pass was removed) with which the interferent component by the wave power of choice of other pass was removed in this way (or composition). Thus, the interference wave power after the computed weighting composition is outputted to the SIR arithmetic circuit 109, and the wave power pair interference wave power ratio of choice is computed in this SIR arithmetic circuit 109 using the interference wave power after weighting, and the wave power of choice after weighting. Thus, since the interferent component according [the interference wave power by which weighting composition was carried out according to (the formula 6)] to a multi-pass is removed, interference by the signal addressed to a local station will be removed.

[0084] Thus, in the gestalt of this operation, in the wave power arithmetic circuit 302 of choice, since the weighting composition according to the reliability (for example, SIR) of the wave power of choice is made and weighting composition according to the reliability of interference wave power is performed in the interference wave power arithmetic circuit 303, the wave power pair interference wave power ratio of choice is computable with a sufficient precision.

[0085] Moreover, to the interference wave power measured for every pass, by removing the interferent component by wave power of choice other than the pass concerned, the accuracy of measurement of interference wave power can be raised, and, according to the gestalt of this operation, measurement of the interference wave power which was not based on fluctuation of the wave power of choice, but was stabilized can be performed in the interference wave power arithmetic circuit 303.

[0086] Furthermore, in the gestalt of this operation, since SIR is computed using the wave power of choice and interference wave power which compounded by carrying out weighting mentioned above, accurate SIR can be obtained.

[0087] (Gestalt 4 of operation) Drawing 4 is a flow chart explaining the procedure to the receiving baseband signaling in the receiving set concerning the gestalt 4 of operation of this invention. In addition, in this drawing 4 , the same sign as drawing 2 is given to the step which performs the same processing as drawing 2 , and that detailed explanation is omitted.

[0088] First, in ST201-ST207, the wave power of choice after weighting composition is computed. In ST401, the interference wave power mean value after weighting composition (interference wave power mean value (N)) is computed according to (a formula 7) in the interference wave power arithmetic circuit 303 shown in drawing 3 .

Interference wave power mean value (K) = Interference wave power mean value (K-1) +[the wave (power K) wishing interference wave (power K) + / SF] / N .... (formula 7)
However, SF is a diffusion coefficient.
[0089] Subsequently, in ST209, if it is K=N, it will shift to ST210, and if it is K!=N, it will shift to ST202. Thereby, processing of ST202-ST209 is repeatedly performed until it becomes K=N. Thus, in case it progresses to ST402 by repeating processing until it becomes K=N, in the wave power arithmetic circuit 302 of choice, the wave power of choice after the weighting composition by which weighting composition of the wave power of choice about all pass was carried out (N) is computed, and the interference wave power mean value (N) by which weighting composition of the wave power of choice about all pass was carried out will be computed in the interference wave power arithmetic circuit 303.
[0090] In ST402, the interference wave power after weighting composition is computed in the interference wave power arithmetic circuit 303 shown in drawing 3 by following for showing below (formula 8) using an interference wave power mean value (N).
Interference wave power [after weighting composition] = The wave (power N) of choice / SF after interference wave power (mean value N)-weighting composition .... (formula 8)
However, SF is a diffusion coefficient.
[0091] It is also possible to compute them with the above procedure, as they are not depended on repeat processing although the wave power of choice after weighting composition (N) and the interference wave power mean value after weighting composition (N) were calculated by repeat processing performed in ST202-ST209, and (formula 2) (formula 6) they are shown.
[0092] Thus, in the gestalt of this operation, since the wave power of choice after weighting composition (N) and the interference wave power mean value after weighting composition (N) are calculated by repeat processing (formula 5) (formula 6), the evacuation memory of processed data is reducible from the case (gestalt 3 reference of operation) where it followed and asks.
[0093] This invention can be carried out using the digital computer and microprocessor of general marketing in which the program for operating the technology indicated in the gestalt of the above-mentioned implementation was included so that clearly [this contractor]. Moreover, this invention includes the computer program created by this contractor based on the technology indicated in the gestalt of the above-mentioned implementation so that clearly [this contractor].
[0094] Moreover, the computer program product which is the record medium which recorded the program for operating the technology indicated in the gestalt of the above-mentioned implementation, and in which computer reading is possible is contained in the range of this invention. Although this record medium is disks, such as a flexible disk, an optical disk, CDROM, and a magnetic disk, ROM, RAM, EPROM and EEPROM, a magnetic optical card, a memory card, or DVD, it is not limited to especially these.
[0095] In addition, in the gestalt of each above-mentioned implementation, the interference wave power measuring circuit 105-1 - 105-N can measure interference wave power with the same measurement cycle as the wave power measuring circuit 104-1 of choice - 104-N. Moreover, the interference wave power measuring circuit 105-1 - 105-N carry out the average (the moving average or section average) of the interference wave power measured with the same measurement cycle as the measurement cycle of this wave power of choice m times, and are good also considering the result of that average processing as interference wave power. Moreover, the period to which the SIR calculation circuit 106-1 - 106-N compute SIR can be considered to be the measurement cycle of the interference wave power in the interference wave power measuring circuit 105-1 - 105-N the same way.
[0096]
[Effect of the Invention] as explained above, according to this invention, it responded to the reliability (for example, SIR) of the wave power of choice to the measured wave power of choice -- be injured with weight -- moreover, since weighting according to the reliability of interference wave power is performed to the measured interference wave power, the wave power pair interference wave power of choice is computable with a sufficient precision.
[0097] Moreover, to the interference wave power measured for every pass, by removing the interferent component by wave power of choice other than self-pass, the accuracy of measurement of interference wave power can be raised, and measurement of the interference wave power which was not based on fluctuation of the wave power of choice, but was stabilized can be performed in this invention.
[0098] Furthermore, in this invention, since SIR is computed using the wave power of choice and interference wave power which carried out weighting as mentioned above, accurate SIR can be obtained.

[Translation done.]

【0097】また、本発明においては、パス毎に測定された干渉波電力に対して、自パス以外の希望波電力による干渉成分を除去することにより、干渉波電力の測定精度を高めることができ、希望波電力の変動によらず安定した干渉波電力の測定ができる。

【0098】さらに、本発明においては、上述のように重み付けをした希望波電力及び干渉波電力を用いてＳＩＲを算出するので、精度の良いＳＩＲを得ることができる。

【図面の簡単な説明】

【図１】本発明の実施の形態１に係る希望波電力対干渉波電力比測定装置を含む受信装置の構成を示すブロック図

【図２】本発明の実施の形態２に係る受信装置における受信ベースバンド信号に対する処理手順を説明するフローチャート

【図３】本発明の実施の形態３に係る希望波電力対干渉波電力比測定装置を含む受信装置の構成を示すブロック図

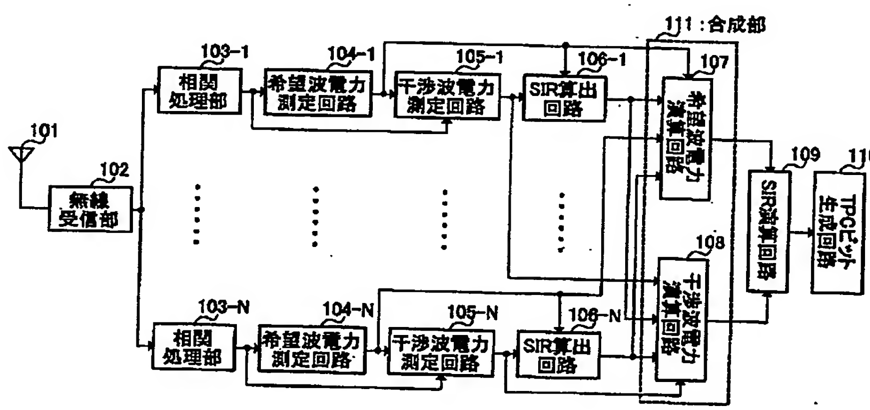
【図４】本発明の実施の形態４に係る受信装置における受信ベースバンド信号に対する処理手順を説明するフローチャート

【図５】従来の希望波電力対干渉波電力比測定装置を含む受信装置の構成を示すブロック図

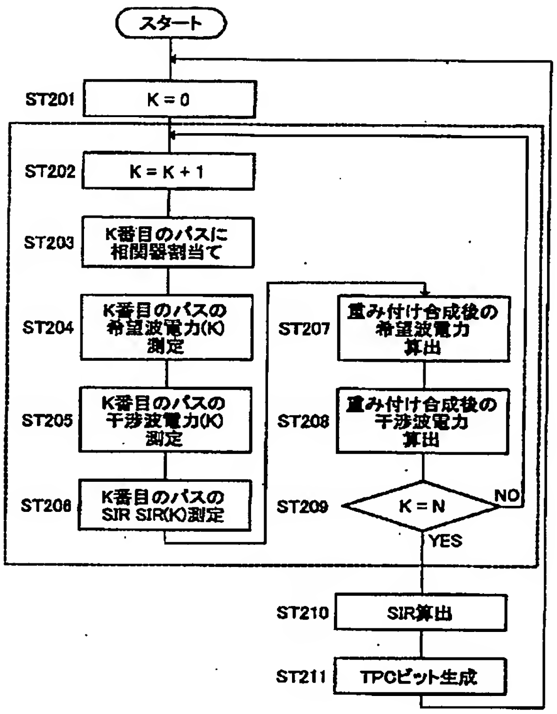
【符号の説明】

１０３−１〜１０３−Ｎ　相関処理部
１０４−１〜１０４−Ｎ　希望波電力測定回路
１０５−１〜１０５−Ｎ　干渉波電力測定回路
１０６−１〜１０６−Ｎ　ＳＩＲ算出回路
１０７、３０２　希望波電力演算回路
１０８、３０３　干渉波電力演算回路
１０９　ＳＩＲ演算回路
１１０　ＴＰＣビット生成回路
１１１、３０１　合成部

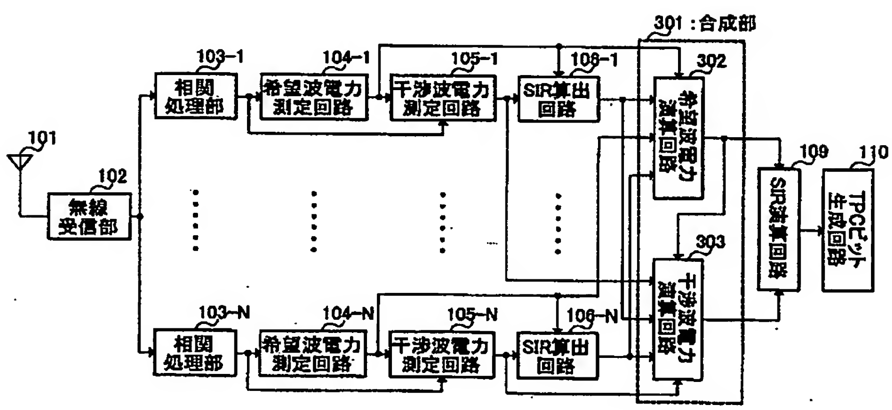
【図１】



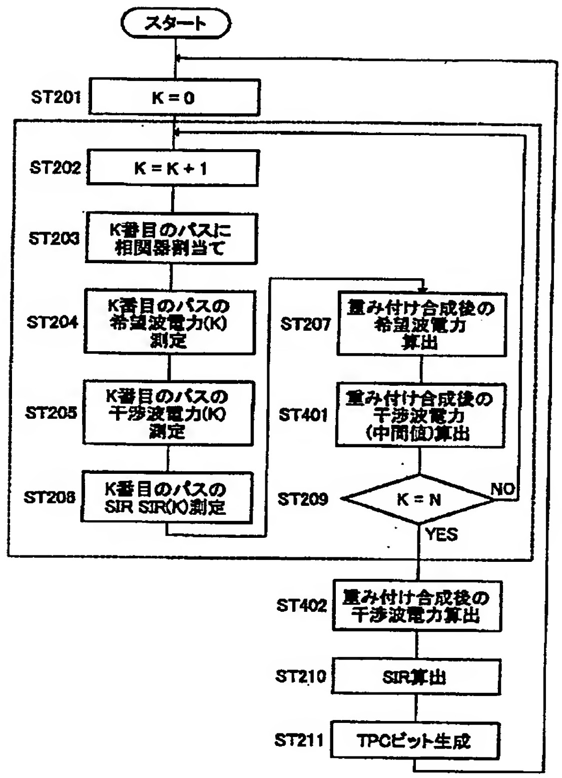
【図2】


スタート
ST201
K＝0
ST202
K＝K＋1
ST203
K番目のパスに
相関器割当て
ST204
K番目のパスの
希望波電力(K)
測定
ST205
K番目のパスの
干渉波電力(K)
測定
ST206
K番目のパスの
SIR SIR(K)測定
ST207
重み付け合成後の
希望波電力
算出
ST208
重み付け合成後の
干渉波電力
算出
ST209
K＝N
NO
YES
ST210
SIR算出
ST211
TPCビット生成

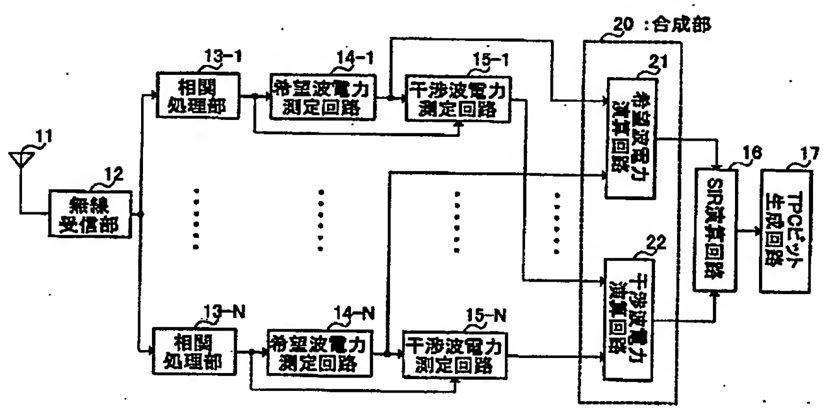
【図3】


301：合成部
101
102
無線
受信部
103-1
相関
処理部
104-1
希望波電力
測定回路
105-1
干渉波電力
測定回路
106-1
SIR算出
回路
302
希望波電力
演算回路
303
干渉波電力
演算回路
103-N
相関
処理部
104-N
希望波電力
測定回路
105-N
干渉波電力
測定回路
106-N
SIR算出
回路
109
SIR演算回路
110
TPCビット
生成回路

【図4】


スタート
ST201
K＝0
ST202
K＝K＋1
ST203
K番目のパスに
相関器割当て
ST204
K番目のパスの
希望波電力(K)
測定
ST205
K番目のパスの
干渉波電力(K)
測定
ST208
K番目のパスの
SIR SIR(K)測定
ST207
重み付け合成後の
希望波電力
算出
ST401
重み付け合成後の
干渉波電力
(中間値)算出
ST209
K＝N
NO
YES
ST402
重み付け合成後の
干渉波電力算出
ST210
SIR算出
ST211
TPCビット生成

【図5】


20 :合成部
13-1
相関
処理部
14-1
希望波電力
測定回路
15-1
干渉波電力
測定回路
21
希望波電力
演算回路
11
12
無線
受信部
16
SIR演算回路
17
TPCビット
生成回路
22
干渉波電力
演算回路
13-N
相関
処理部
14-N
希望波電力
測定回路
15-N
干渉波電力
測定回路